

## APPENDIX 1

### Case Study: The Pennsylvania Dirt and Gravel Roads Program

In 1997, Pennsylvania introduced a program that provides an annual \$5 million appropriation for “[Environmentally Sensitive Maintenance](#)” for our nearly 20,000 miles (38,180 km) of dirt and gravel roads. The program addresses three critical components: Thought and Attitude, Cost Effective Best Management Practices, and Technology Transfer. In developing an understanding of the problem, the program team, spearheaded by the State Conservation Commission, developed a philosophy that simplifies administration, holds the stream sacred, and strives for better roads and reduced maintenance. This exemplifies a major change in “thinking and doing” for road maintenance personnel, where traditionally the road had priority. The program leads them to consider both the road and the environment as important and how natural systems can help with overall road maintenance.

**A1.1 Pennsylvania’s Dirt and Gravel Roads.** Pennsylvania has over 117,000 total miles (188,253 km) of public roads, including both paved and unpaved. Local municipal governments own and maintain two thirds of that total mileage. Of that total mileage, nearly 20,000 miles (32,180 km) are unpaved dirt and gravel roads.

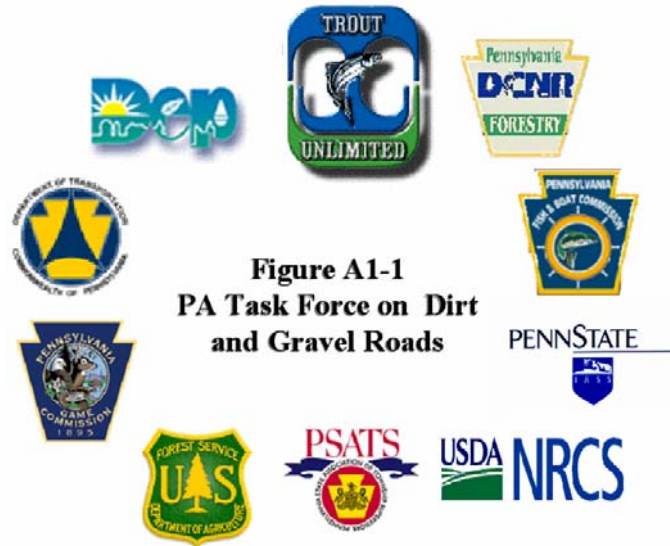
Local municipal governments own and maintain the majority of dirt and gravel roads with over 17,000 miles (27,353 km). The PA Department of Conservation and Natural Resources (DCNR), Bureau of Forestry owns and maintains over 2500 miles (4023 km). The PA Department of Transportation (PENNDOT) has less than 500 miles (805 km). This number continues to decline due to PENNDOT’s Turnback Program (PENNDOT pays \$2500 per mile as an annual sum added to a municipality’s liquid fuels funds for any state roads “turned back” to the municipality to own and maintain). Other agencies having nominal mileage are the DCNR Bureau of State Parks, the PA Fish and Boat Commission, and the PA State Game Commission. Dirt and gravel road mileage continues to decline as development and traffic volumes increase and more and more roads become paved, but dirt and gravel roads will remain a significant part of Pennsylvania road mileage into the future.

Pennsylvania’s dirt and gravel roads play an important role for the commonwealth. They provide vital direct access for over 3.6 million PA residents, although probably used by almost all of PA’s 12 million people. They also provide vital access to Pennsylvania’s industry, namely our top industries of agriculture, forestry, mining and tourism. In fact, tourism is projected to become our state’s number one industry, a position that has been held by agriculture. To emphasize, Pennsylvania’s dirt and gravel roads have always played an important role, are still playing that role, and will remain playing that role into the future.

**A1.2 Program Origin: A Problem Recognized.** In January 1991, a man by the name of James “Bud” Byron, active in Trout Unlimited, instigated a Northcentral Pennsylvania Conference of parties interested in protecting streams from [sediment](#)

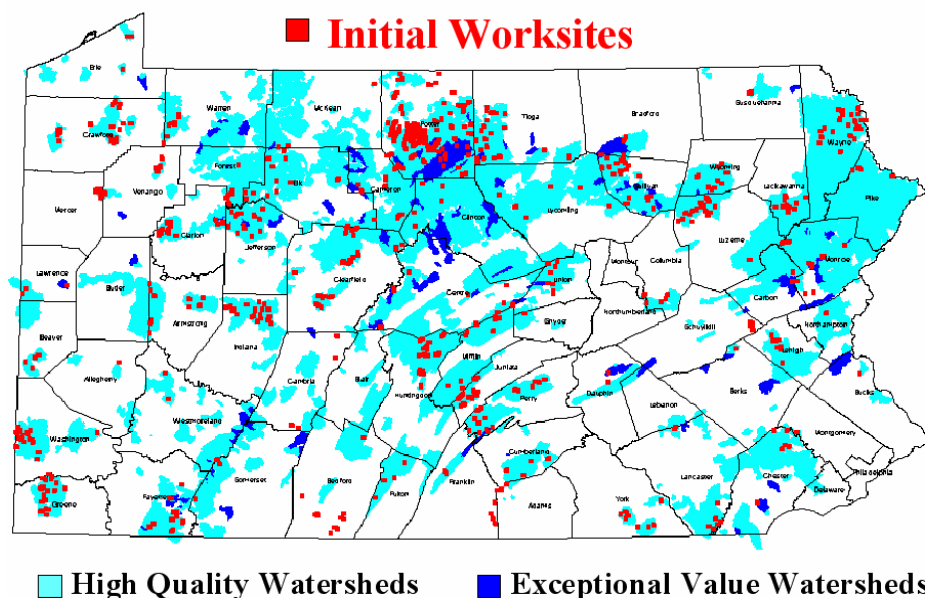
pollution associated with dirt and gravel roads. The results and publicity of that meeting held in Pleasant Gap, PA, sowed the seeds of the program.

**A1.3 Program Origin: A Problem Substantiated.** Lead by Trout Unlimited, various individuals, organizations and agencies became active in addressing this problem on a statewide basis. In 1993, they formed the Dirt and Gravel Road Task Force, (Figure A1-1). The Task Force set out to substantiate the extent of the problem. They began by conducting field surveys of roads and streams to identify actual conditions in the affected [watersheds](#). Using volunteers (no funding was available), they zeroed in on protected [watersheds](#) identified as Exceptional Value and High Quality. Just surveying these areas was a huge undertaking (Figure A1-2). A great number of volunteers were needed, and Trout Unlimited, with its 55 PA chapters, provided most of the manpower. A simplified manual card system was developed to record actual field conditions. The volunteers received onsite training to help ensure consistent results. These surveys identified actual “trouble spots” of [sediment](#) pollution into streams throughout the commonwealth. These pollution trouble spots became the initial worksites and, when viewed plotted on a map (Figure A1-2), substantiated the problem.



**Figure A1-1**  
**PA Task Force on Dirt and Gravel Roads**

**Figure A1-2: Result – A Problem Substantiated**



**A1.4 A Solution.** With the problem substantiated, the Task Force needed to look at a solution. Who was maintaining these dirt and gravel roads? Why were the problems of [erosion](#) and [sediment](#) occurring? What did they need to do to correct the problems? Municipal governments owned the roads, so the Task Force looked to existing road maintenance. They found that even though the goal was to maintain good roads, existing accepted maintenance practices did not always adequately address environmental concerns. To solve the existing and continually occurring pollution problems required maintenance managers to change their thinking to see the road as part of the environment. This change in thinking had to lead to changes in procedures. Improved maintenance techniques that were good for both the roads and the environment had to be used. To initiate this change, the task force recognized two major needs – training and money.

Legislation was necessary to meet these needs. Pennsylvania Senator Doyle Corman became the program champion and drafted legislation, which became part of the PA Transportation Revenue Bill, signed into law as PA Act 3 of 1997. Section 9106 was added to the PA Motor Vehicle Code, initiating the Dirt and Gravel Road Program.

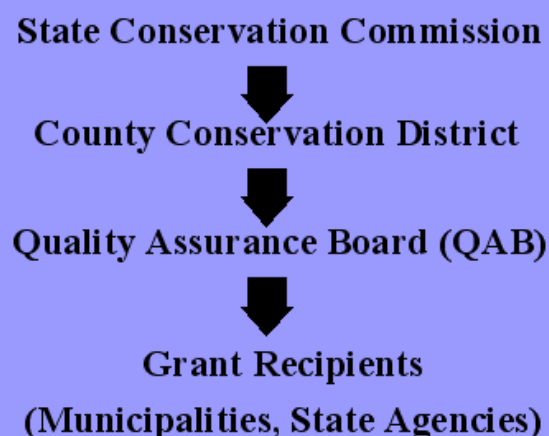
**A1.5 The Legislation.** Section 9106 created an annual, non-lapsing \$5 million appropriation for Dirt and Gravel Road Maintenance to address the pollution problems of [erosion](#), [sediment](#), and [dust](#). Section 9106 took effect July 1, 1997. The legislation provides that \$1 million go directly to the Bureau of Forestry for their roads and that the other \$4 million go to the State Conservation Commission, the lead agency for the program. This annual \$4 million was to be used as grants for [environmentally sensitive maintenance](#) projects on dirt and gravel roads.

The legislation stated that the identified “trouble spots” would be the top priority, recognizing the significance of the volunteer work that substantiated the problem and led to the legislation.

The legislation also **required grant recipients to receive training** as a prerequisite to applying for grant funds.

**A1.6 Program Organization.** The PA State Conservation Commission serves as the lead agency for the program (Figure A1-3). They allocate the money to the County Conservation Districts who are responsible for administering the program at the local level. Each County Conservation District is required to implement a Quality Assurance Board (QAB) who reviews and

**Figure A1-3: Program Administration**



prioritizes grant applications and provides assurance of project completion in accordance with the applications. This board provides recommendations back to the County Conservation District for formal approval. To benefit from a variety of background and experiences, the QAB is comprised of four members: a chairman from the County Conservation District (non-voting) and three voting members, one appointed by the County Conservation District, one appointed by the PA Fish and Boat Commission, and one appointed by the National Resource Conservation Service (NRCS).

Grant recipients are the local municipalities or state agencies that own and maintain dirt and gravel roads.

Two major points emphasized through the program legislation are simplicity and local control. The program organization meets these points with a requirement of a one-page grant application form and with the charge given to the County Conservation Districts to implement the program. What better way to keep it simple and have the program handled at the local level?

**A1.7 Program Goal.** The program's major goal is to reduce the pollution due to [erosion](#), [sedimentation](#), and [dust](#) associated with dirt and gravel roads in the commonwealth. To meet this goal, a strong program basis to protect the dirt and gravel roads was formulated. Several decisions were made by the program initiators and agreed upon through the legislation.

First, the program supports maintaining dirt and gravel roads as dirt and gravel. The program will not fund paving these roads. Second, to minimize road maintenance and stretch limited resources, cost effective maintenance practices that are not only good for prolonging road life but also for protecting the environment are essential.

This program goal and basis led to the required training with its own rationale and objectives.

**A1.8 Program Training.** The Pennsylvania State University, through the Pennsylvania Transportation Institute and the Environmental Resources Research Institute, were originally charged with development and delivery of the training associated with the Dirt and Gravel Road Maintenance Program. Since then, a Center for Dirt and Gravel Road Studies, in conjunction with Penn State University, was funded through contract with the PA State Conservation Commission. This Center now administers the education, training and technical assistance aspects of the program.

The major purpose of the training was simple – to meet the requirements of the legislation which required anyone who applies for program funding to attend a training course as a prerequisite.

The course was simply titled, following the legislation, “[Environmentally Sensitive Maintenance](#) for Dirt and Gravel Roads.” The program goal, as stated, is to reduce [erosion](#), [sediment](#), and [dust](#) pollution relating to dirt and gravel roads. To meet

this major goal, the training centers on the philosophy and rationale as discussed above in [Section 1.4.1](#) for this manual.

To meet the main program goal, objectives similar to the ones outlined above in [Section 1.4.2](#) for this manual were adopted along with an additional objective to provide the trainee with information on associated laws and regulations and with the information on grant funding procedures.

The training gives them a “tool box” full of [environmentally sensitive maintenance](#) “tools” or practices, recognizing that not one tool or practice can fit every situation or site or solve all their problems. These practices are mostly simple, practical, cost effective techniques that can be easily implemented. Municipal road crews with available equipment resources can perform most of the practices, incorporating them into their normal routine road maintenance program. Not all practices will apply to any one municipality’s roads, but having a full toolbox from which to choose the best tool or tools to address the problem or concern encountered tends toward a more successful solution. Many of these practices can be used in combination and will apply to most dirt and gravel roads in general

The training is a two-day course and consists of classroom training only. The possibilities of field trips to nearby roads were discussed, but weather and the logistics of coordinating transportation to the site does not lend to the feasibility. The time factor also comes to play an important deterrent.

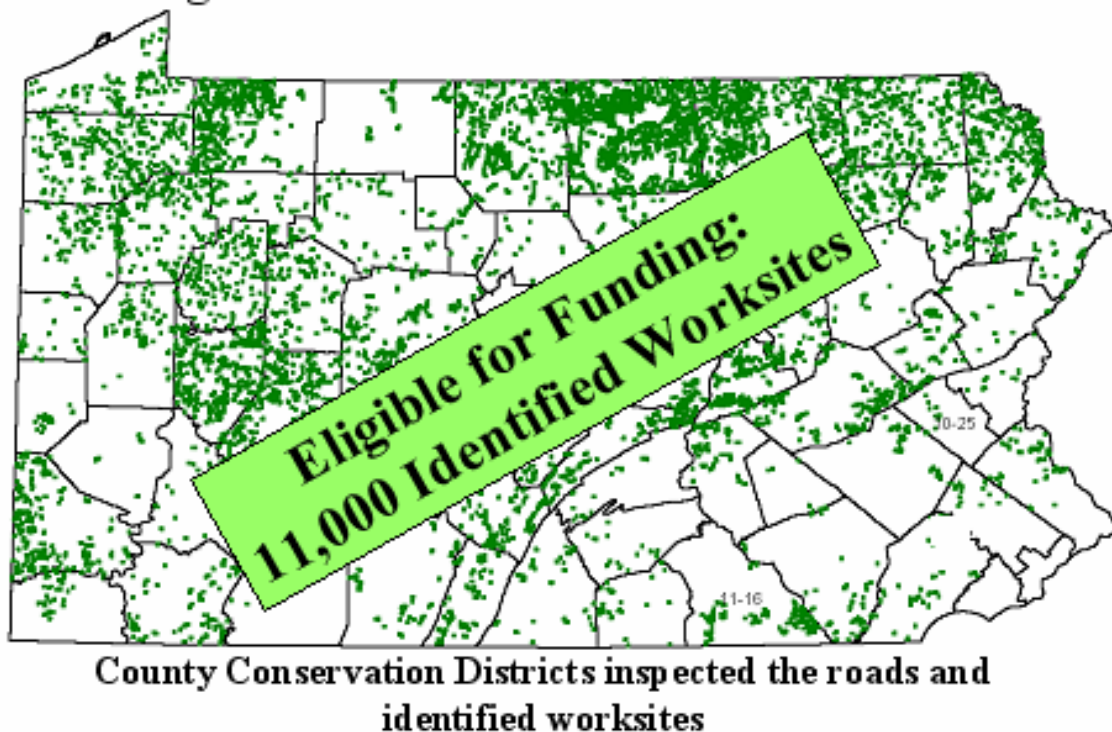
The training uses PowerPoint® presentations with an LCD projector and projection screen. The PowerPoint® presentations contain all the digitized photos and several video clips to enhance, clarify, or show examples. Trainers also use various samples of products, particularly [geosynthetic](#) products.

Training evaluation sheets are distributed at each session. Results have been overwhelmingly favorable on all aspects of the training. Acceptance by municipal road personnel of the many practices presented has been greater than expected. This is a testament to the dedication and concern of local municipal government road personnel.

**A1.9 Further Program Development.** A new inventory and assessment of PA’s dirt and gravel roads were completed with the establishment of the new Center for Dirt and Gravel Roads. County Conservation Districts worked with the local governments to verify unpaved roads via municipal and county maps. All identified roads then received field assessments by the County Conservation Districts for pollution problems affecting streams. This new assessment identified over 11, 000 new sites across the commonwealth which then became eligible for program funding (Figure A1-4).



**Figure A1-4: Assessment Phase II Results**



**A1.10 Program Results.** The program has been and continues to be a success. Projects undertaken and completed with program funds have been evaluated. A computerized GIS system is used for project tracking and central reporting with minimal paperwork. An implemented quality assurance/quality control (QA/QC) process continually monitors and evaluates completed projects, verifying that all but one project has met or exceeded expectations.

The following page is the 2006 Program Report reflecting a summary of the program data showing 1608 projects completed by the close of 2006. The summary gives a breakdown of program funding, completed project costs and major work items, and a training summary of sessions and attendees. It should be interesting to note the amount of in-kind contributions, which are the materials and services donated to the projects by the local government grantees. Although contributions are not required and the projects are 100% fundable with program grant monies within the prescribed parameters, the in-kind contributions have averaged 36%. Comparing this to the many federal and state grant programs that require 10 to 25% matching funds, we can see the substantial **voluntary** commitment made by the Pennsylvania local governments. This factor again speaks to the acceptance and success of the program.

## **2006 - DIRT AND GRAVEL ROAD PROGRAM SUMMARY DATA**

-----All Data is CUMULATIVE Based on District Reports as of January 15, 2007-----

### **FINANCIAL SUMMARY TO DATE**

<b>Total Allocated to Districts -</b>	<b>\$35,187,000</b>	<i>includes 10 years of funding</i>
Spent on administration -	\$2,203,000	<i>(6.3% of total allocated) limit of 10%</i>
Spent on education -	\$594,000	<i>(1.7% of total allocated) limit of 5%</i>
Spent on completed contracts (1,608)-	\$25,381,000	<i>(72% of total allocated) (In-kind not included)</i>
Current contract commitments (196)-	\$3,796,000	<i>(11% of total allocated) (Partially completed project included here)</i>
<b>TOTAL SPENT/COMMITTED -</b>	<b>\$31,974,000</b>	<b><i>(91% of total allocated)</i></b>

**WORKSITE:** a section of unpaved road that is a verified source of pollution to an adjacent stream.

\*\*\*\*\*In-Kind Contributions - \$9,147,000 *(donated goods/services from participants) (Avg 36¢ per \$1 spent)* \*\*\*\*\*

### **COMPLETED PROJECT COST SUMMARY**

*note that some worksites have multiple contracts complete*

**Contracts complete - 1,608                      Length of contracts complete - 826 miles**

#### **BREAKDOWN of \$25,381,000 Program funds spent on completed contracts:**

\$20,340,000 for materials (80%),    \$3,725,000 for equipment (15%),    \$1,316,000 for labor (5%)

#### **BREAKDOWN of \$9,147,000 In-kind contributions for completed contracts:**

\$1,451,000 materials (16%),    \$4,045,000 equipment (44%),    \$3,262,000 labor (36%),    \$389,000 other (4%)

### **COMPLETED PROJECT WORK SUMMARY**

5.7 Acres Eroded Stream Bank Stabilized	= a steam bank 5 feet high and 9.4 miles long
6.7 Acres Drainage Outlets Stabilized	= 2,918 outlets, each 10' x 10'
68 Acres Vegetative Management	= an area 10 feet wide 56 miles long
67 Acres Eroded Road Bank Stabilized	= a road bank 5 feet high and 110 miles long
71 Acres Eroded Road Ditch Stabilized	= a ditch 5 feet wide and 117 miles long
117 Acres Separation Fabric Used	= 54 miles of fabric placed 18 feet wide
773 Acres Road Surface Stabilized	= 354 miles of road 18 feet wide
4,610 Crosspipes Installed	= 5.6 pipes per mile of project
178,400 Feet of Crosspipes Installed	= 34 miles of pipe; average crosspipe length is 39'
581,700 Cubic Yards of Road Base Added	= 1 acre of ground covered to a depth of 360 feet

### **COMPLETED PROJECTS**

YEAR	# Contracts Complete	Money Spent on Completed Projects*	Average Spent per Contract*
1998-2003	1,156	\$ 16,198,000	\$ 14,012
2004	173	\$ 3,253,000	\$ 18,803
2005	136	\$ 3,255,000	\$23,934
2006	143	\$ 2,675,000	\$ 18,706
<b>TOTAL</b>	<b>1,608</b>	<b>\$25,381,000</b>	<b>\$ 15,784</b>

\*in-kind not included

### **2-DAY TOWNSHIP TRAINING SUMMARY:**

YEAR	# of Trainings	Municipal- ities Trained	Counties Represented	Total Attendees
1998-2002	115	na	all	3208
2004	8	142	53	294
2005	13	220	56	574
2006	12	254	57	465
<b>TOTAL</b>	<b>148</b>	<b>na</b>	<b>all</b>	<b>4541</b>

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The PA Dirt and Gravel Road Program is well established and continues to meet its goal of pollution reduction. The training is constantly under review and changes as more program work projects are completed. The program uses new experiences to develop new practices and test new materials. Environmentally Sensitive Maintenance Practices have been accepted and are being put to use, many of which apply to paved roads as well as unpaved gravel roads. This acceptance, as mentioned before, attests to the dedication and desire to do things better on the part of municipal road personnel. It is best put by one long-time Township Roadmaster who stated: “I wish I would have known these things 30 years ago!”

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